WHAT IS CLAIMED IS:

1. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, a waveguide, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body, and a vacuum chamber, wherein a plasma is generated by an electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides, which are arranged in contact with each other;

the plasma processing apparatus includes an electromagnetic wave distributing waveguide portion for distributing the electromagnetic wave from the electromagnetic wave source into the plural waveguides; and

the electromagnetic wave radiation window constitutes a part of the wall of the vacuum chamber, and the vacuum condition is retained between the electromagnetic wave radiation window and the other wall of the vacuum chamber.

2. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave

source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

each of the plural waveguides is branched from the electric field plane or the plane perpendicular to the magnetic field plane of the electromagnetic wave distributing waveguide portion.

3. A plasma processing apparatus for performing a

plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber arranged to include the electromagnetic wave radiation window as an incident plane of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

the transmission direction of the electromagnetic wave is bent at substantially right angles in the electromagnetic wave distributing waveguide portion so as to permit the electromagnetic wave to be distributed

into the plural waveguides.

4. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of an dielectric body and arranged to face the plural slots, and a vacuum chamber arranged to include the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein the plasma processing apparatus is constructed such that:

a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window;

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides;

each of the plural waveguides is branched from the electric field plane of the electromagnetic wave

distributing waveguide portion; and

the electromagnetic wave distributing waveguide portion and the plural waveguides are arranged on substantially the same plane.

5. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber arranged to include the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein the plasma processing apparatus is constructed such that:

a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window so as to carry out the plasma processing;

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave

generated from the electromagnetic wave source into each of the waveguides; and

the shortest distance between the inner surfaces of the adjacent waveguides is not larger than the width between the inner surfaces of the one waveguide.

6. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber arranged to include the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein the plasma processing apparatus is constructed such that:

a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window;

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave

generated from the electromagnetic wave source into each of the plural waveguides; and

the plural waveguides are branched from the electromagnetic wave distributing waveguide portion toward both side.

7. The plasma processing apparatus according to claim 6, wherein the plural waveguides are branched at substantially right angles from the electromagnetic wave distributing waveguide portion toward both sides.

8. The plasma processing apparatus according to claim 6, wherein the electromagnetic wave distributing waveguide portion and the plural waveguides are arranged on substantially the same plane.

9. The plasma processing apparatus according to claim 2, wherein a plurality of electromagnetic wave radiation windows are arranged such that the vacuum condition is maintained between the plural electromagnetic wave radiation windows and the vacuum chamber.

10. The plasma processing apparatus according to claim 3, wherein a plurality of electromagnetic wave radiation windows are arranged such that the vacuum condition is maintained between the plural electromagnetic wave radiation windows and the vacuum chamber.

11. The plasma processing apparatus according to claim 4, wherein a plurality of electromagnetic wave

radiation windows are arranged such that the vacuum condition is maintained between the plural electromagnetic wave radiation windows and the vacuum chamber.

12. A plasma processing apparatus, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed in the waveguide and constituting a waveguide antenna, and a vacuum chamber maintaining the vacuum condition, wherein the plasma processing apparatus is constructed such that:

a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber;

at least one waveguide is arranged in the vacuum chamber; and

a dielectric body member constituting a part of the wall surface of the vacuum chamber is formed in the said waveguide, the vacuum condition is maintained by a part of the wall of the waveguide, the dielectric body member, and another part of the vacuum chamber, and the electromagnetic wave is introduced into the vacuum chamber through the dielectric body member.

13. The plasma processing apparatus according to

claim 12, wherein the dielectric body member fills substantially the entire volume within the waveguide.

14. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein the slots are distributed substantially

uniformly over the entire area that is to be subjected to the plasma processing.

15. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein a plurality of the electromagnetic wave

radiation windows are hermetically arranged in a manner to correspond commonly to the plural slots, and the vacuum condition is maintained between the plural electromagnetic wave radiation windows and the vacuum chamber.

16. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave

generated from the electromagnetic wave source into each of the plural waveguides; and

the electromagnetic wave radiation window substantially equal in width to the waveguide is arranged in a manner to correspond to each of the waveguides;

the major axis direction of the waveguide substantially coincides with that of the electromagnetic wave radiation window;

the length in the major axis direction of the waveguide substantially coincides with that of the electromagnetic wave radiation window; and

the period of the major axis of the waveguide substantially coincides with the that of the electromagnetic wave radiation window.

17. The plasma processing apparatus according to claim 16, wherein the length in the major axis direction of the electromagnetic wave radiation window is shorter than that of the waveguide.

18. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide

and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein the dielectric body member commonly in contact with at least one electromagnetic wave radiation window is arranged within the vacuum chamber.

19. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide

and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein the beam body supporting each of the electromagnetic wave radiation windows on the side of the vacuum chamber is covered with the dielectric body member at least.

20. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide

portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein a water cooling pipe for controlling the temperature is arranged within the beam body positioned between the adjacent electromagnetic wave radiation windows for supporting the electromagnetic wave radiation windows or in that portion of the beam body which is in contact with the waveguide.

21. A plasma processing apparatus for performing a plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for

transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein a gas introducing pipe is formed within the vacuum chamber below the beam body positioned between the adjacent electromagnetic wave radiation windows for supporting the electromagnetic wave radiation windows or below that portion of the vacuum chamber which is in contact with the waveguide.

22. A plasma processing apparatus for performing a

plasma processing, comprising an electromagnetic wave source for generating an electromagnetic wave, an electromagnetic wave distributing waveguide portion for transmitting the electromagnetic wave generated from the electromagnetic wave source, a waveguide connected to the electromagnetic wave distributing waveguide portion, a plurality of slots formed on the waveguide and constituting a waveguide antenna, an electromagnetic wave radiation window consisting of a dielectric body and arranged to face the plural slots, and a vacuum chamber including the electromagnetic wave radiation window as an incident surface of the electromagnetic wave, wherein a plasma is generated by the electromagnetic wave radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, the plasma processing apparatus being constructed such that:

the plasma processing apparatus includes a plurality of the waveguides;

the electromagnetic wave distributing waveguide portion serves to distribute the electromagnetic wave generated from the electromagnetic wave source into each of the plural waveguides; and

wherein a gas introducing pipe is formed of a dielectric body within the vacuum chamber under the electromagnetic wave radiation windows or integrated the electromagnetic wave radiation windows.

23. The plasma processing apparatus according to claim 6, wherein the slot is formed in the electromagnetic wave distributing waveguide portion, too.